

Factors associated with delivery outside a health facility: cross-sectional study in rural Malawi

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Abstract

OBJECTIVE To identify factors associated with delivery outside a health facility in rural Malawi.

METHOD A cross-sectional survey was conducted in Balaka, Dedza, Mchinji and Ntcheu districts in Malawi in 2013 among women who had completed a pregnancy 12 months prior to the day of the survey. Multilevel logistic regression was used to assess factors associated with delivery outside a facility.

RESULTS Of the 1812 study respondents, 9% ($n = 159$) reported to have delivered outside a facility. Unmarried women were significantly more likely [OR = 1.88; 95% CI (1.086–3.173)] to deliver outside a facility, while women from households with higher socio-economic status [third-quartile OR = 0.51; 95% CI (0.28–0.95) and fourth-quartile OR = 0.48; 95% CI (0.29–0.79)] and in urban areas [OR = 0.39; 95%-CI (0.23–0.67)] were significantly less likely to deliver outside a facility. Women without formal education [OR 1.43; 95% CI (0.96–2.14)] and multigravidae [OR = 1.14; 95% CI (0.98–1.73)] were more likely to deliver outside a health facility at 10% level of significance.

CONCLUSION About 9% of women deliver outside a facility. Policies to encourage facility delivery should not only focus on health systems but also be multisectoral to address women's vulnerability and inequality. Facility-based delivery can contribute to curbing the high maternal illness burden if authorities provide incentives to those not delivering at the facility without losing existing users.

keywords maternal care, facility-based delivery, skilled birth attendance, Malawi, sub-Saharan Africa

Introduction

Maternal and neonatal mortality and morbidity continue to pose important health burdens particularly in low- and middle-income countries (LMICs). In 2010, the maternal mortality ratio (MMR) in LMICs was 15 times higher than that of high-income countries. Sub-Saharan Africa (SSA) had the highest MMR at 500 maternal deaths per 100 000 live births [1]. Likewise, 35 newborns per every 1000 live births die every year in SSA due to poor management during labour and delivery [2]. Among the various strategies being proposed, skilled attendance at birth has been identified as the most promising in curbing maternal and neonatal mortality and morbidity [3, 4].

Skilled attendance at birth, mostly reflected in facility-based delivery, allows deliveries to take place in the presence of a specifically trained professional who can promptly identify and respond in a timely manner in case complications arise [3–6]. Substantial investments have

been made across SSA to increase access to skilled birth attendance [4] where trained midwives are available to support women during labour and delivery [7] by facilitating access to facility-based deliveries, by improving quality of care, removing relevant fees and/or providing women with monetary incentives [8–10].

In Malawi, the MMR was estimated at 675 deaths per 100 000 live births in 2010, [11] which is above the average for the SSA region. In line with emergency obstetric and neonatal care guidelines from the World Health Organization (WHO) [12–15], the Ministry of Health (MoH) has reorganised the provision of maternal care services into basic emergency obstetric care (BEmOC) facilities and comprehensive emergency obstetric care (CEmOC) facilities [14–16]. The BEmOC facilities are first-level facilities able to perform seven BEmOC signal functions, while the CEmOC facilities are second-level or higher level referral facilities that, in addition to performing the BEmOC functions, are also capable of

managing advanced complications through Caesarian sections and blood transfusion [17]. In addition to public, officially authorised EmOC facilities, there are a few private facilities that provide maternal care services, primarily antenatal and postnatal care, but are not recognised by the MoH as official EmOC providers [18]. In Malawi, maternal care services, including antenatal, delivery and postnatal care, are delivered free of charge at public facilities [18], but women seeking care still incur substantial costs due to transportation, payments outside the public system and informal payments [19, 20].

The current EmOC service provision model assumes that all designated facilities have the required resources to provide care, including health workers, equipment and drugs. However, facilities frequently experience drug stock-outs and may not have sufficient human resources nor adequate equipment [17]. In Malawi, due to shortage of midwives [17], it may not be feasible to have a midwife attend to a woman at home as she is at the same time required to attend to many other women at the facility. Birth houses, which are neither health centres nor hospitals, are also not advisable because transport to a health facility when a problem a medical emergency occurs cannot be assured. Birth houses may not be equipped to deal with common emergencies.

In response to the high maternal and neonatal mortality rates of 2010, the local MoH has attempted to strengthen maternal and neonatal services through community mobilisation campaigns, discouragement of deliveries by traditional birth attendants (TBAs), training of health workers in midwifery skills and the construction of maternity waiting shelters [17, 18, 21, 22]. Furthermore, the MoH is seeking to improve access to facility-based delivery through the provision of service contracts with not-for-profit private providers to ensure women access to services they require in those areas of the country not covered by public facilities [17, 18].

Available data indicate that utilisation of facility-based delivery has increased from 57.2% in 2004 [23] to 73.2% in 2010 [11]. Still, these data indicate that a substantial proportion of all women, almost one-third, continues to deliver outside a facility (and thus with no skilled attendant), most frequently at home. While several studies have assessed factors associated either with facility-based delivery or home delivery in SSA [24–30], only two studies have performed so in Malawi [31, 32]. These two studies identified an association between home delivery and a woman's region, rural residency, lower socio-economic status, lower education, lower number of prenatal visits and non-use of family planning services [31, 32]. Although published in 2011 and 2007, respectively, both studies used data that were collected in 2004

[31, 32] and are therefore somewhat outdated, considering the dynamic nature of the issue at stake and the recent governmental efforts as outlined above, to enhance facility-based delivery. Therefore, our study aimed at filling a gap in knowledge, essential to adequately inform further policies, by assessing rates of facility-based delivery and factors associated with the decision to still deliver at home, within the context of the pertinent reforms advanced in Malawi over the last few years.

Methods

Study setting

The study was conducted in 2013 in four districts in Malawi: Balaka in the southern region and Dedza, Mchinji and Ntcheu in the central region. These districts have a total population of about 2 million, of which 52% are women. The average population growth rate is 3.48% [33] and the total fertility rate for Malawi as a nation is 5.7 [11]. The four districts count a total of 33 facilities officially offering BEmOC and CEmOC services. Our study focused on these four districts given that the first results-based financing (RBF) initiative in the country is being piloted there.

Data

Data were collected through a cross-sectional household survey conducted between April and May 2013, which served as the baseline survey for a larger impact evaluation targeting the RBF initiative mentioned above [34].

The survey sample was selected using a three-stage cluster sampling procedure. First, 33 clusters were defined as the catchment areas of the 33 healthcare facilities that are authorised to provide EmOC services. Second, two enumeration areas (EAs) and four EAs were randomly sampled within each BEmOC and each CEmOC catchment area (i.e. cluster), respectively. The enumeration areas used in this study are the administrative data collection units demarcated by the National Statistics Office [11] and count roughly 500 households with between 1000 and 2000 people [33, 35]. Twice as many EAs were selected from the CEmOC as compared to the BEmOC clusters to account for a larger catchment population and potential urban–rural differences. Third, in each EA, we aimed to reach a total of 26 women who had completed a pregnancy (either through miscarriage, abortion, still-birth or delivery of a live baby) in the previous 12 months.

We identified the women to be interviewed using a random route approach [36], purposely independent of any

support from village leaders or healthcare providers. After randomly identifying one point in each EA (not the central point), our interviewers randomly selected a path (random route), followed it and stopped at every household on that path to enquire whether any woman in the household had completed a pregnancy in the previous 12 months. Every time such a woman was found, the interviewers explained the aim of the study and asked for consent to proceed with the interview. The process of data collection was continued until at least 26 eligible women were identified and interviewed in each EA.

Data were collected by trained interviewers using a structured questionnaire that was digitally programmed and administered using tablet computers. The questionnaire was administered in Chichewa, the local language, and prompted women to recall the type of healthcare services sought during the most recently ended pregnancy, including antenatal care (ANC), delivery and postnatal care (PNC), as well as the relevant out-of-pocket expenditure. In addition, questions were asked to define the women's socio-demographic and socio-economic profile. The information reported on health service utilisation was systematically validated using the information recorded in the mothers' health booklet (i.e. health passport) [18]. All data reported in this study were collected after the woman was duly and thoroughly informed of the study's purpose and signed a written consent was obtained. The study protocol was approved by the College of Medicine Review and Ethics Committee, Malawi (protocol number P.08/13/1438) and the Ethics Committee of the Faculty of Medicine of the University of Heidelberg (protocol number S-256/2012).

Variables and their measurement

Access to and utilisation of facility-based delivery represent multidimensional concepts as they depend on the interaction between the individual, her household, and the surrounding community and healthcare system [37]. The utilisation of any health service, including labour and delivery services, can be explained by Andersen's behavioural model [38–41], which recognises healthcare utilisation as the result of the interaction between predisposing factors (such as age, income, parity and health beliefs), enabling resources (community and family resources), need (perceived and actual) and supply-side characteristics (organization of health system) [38]. We collected data on predisposing, enabling, and need factors and not on supply-side characteristics because this was a household survey. The choice of variables used in our study is based on the different dimensions outlined by Andersen's model.

In addition to other data, Table 1 lists all the variables included in our analysis. Most of the variables included in the analysis are self-explanatory. We defined the outcome variable as binary, distinguishing women who delivered at a facility (coded as 0) from women who delivered elsewhere, most frequently at home (coded as 1). A woman was classified as having had a facility-based-delivery if she delivered in a regional hospital, district hospital or health centre. A woman was classified as having had a delivery outside a health facility if she delivered at home, at the premises of a TBA or on the way to a health facility. Thus, a facility in the study was defined as an institution, whether public or private, where delivery and birth took place in the presence of a skilled attendant, usually a trained midwife. Socio-economic status was defined by a relative index of household wealth computed by aggregating a household assets profile using principal components analysis [42, 43]. The components of the household profile included in the index were as follows: house ownership; characteristics of house of residence such as number of rooms, type of wall, roofing material, floor material, dominant source of lighting and water, and type of toilet owned by household; household assets ownership such as radio, television, phone and bicycle; and ownership of agricultural assets such as farmland, goats, sheep, pigs and poultry. Distance to healthcare facilities was measured in kilometres and calculated as a straight line from the household compound to the relevant referral healthcare facility using global position system (GPS) coordinates [44].

Data analysis was conducted using Stata IC 13 (Stata-Corp LP, Texas, USA). Descriptive statistics were used to assess the general distribution of the variables in the sample and to provide an initial comparison between women delivering at a facility and women delivering elsewhere. Frequency distributions and chi-square tests of independence were computed for categorical variables, while means, standard deviations and *t*-tests were computed for continuous variables [45, 46].

Given the binary nature of the outcome variables, a multilevel logistic regression model was used to identify factors that were associated with non-facility-based delivery. Multilevel modelling was used to account for clustering at the level of the facility catchment area. The statistical significance of the fixed parameters was tested using a Wald 95% confidence interval [47]. Model identification of the regression was conducted using a step-up approach by means of a likelihood ratio test of goodness of fit [48]. At first, a simple logistic model with only the intercept was run. Then, one explanatory variable was added to the model. The models were tested to assess whether the model with the intercept only is nested

Table 1 Variable distribution and Unadjusted Odds Ratios ($n = 1812$)

	Univariate analysis*	Bivariate analysis	
Variable	Total sample: <i>n</i> (%)	Delivery outside a health facility†- <i>n</i> = 159 (9%): <i>n</i> (%)	Odds ratio (95% CI)
Predisposing factors			
Age			
Below 22 years	601 (33)	40 (7)	1.000
From 22 to 29 years	701 (39)	46 (7)	0.98 (0.635–1.527)
More than 29 years	510 (28)	73 (14)	2.34 (1.557–3.526)
Marital status			
Currently married	1578 (87)	130 (8)	1.000
Unmarried	234 (13)	29 (12)	1.576 (1.026–2.420)
Education			
No formal education	1006 (56)	94 (12)	1.000
Some formal education	806 (44)	65 (6)	0.523 (0.375–0.729)
Religion			
Christian	1573 (87)	25 (10)	1.00
Non-Christian	239 (13)	134 (9)	1.25 (0.799–1.969)
Ethnicity			
Chewa	719 (40)	48 (7)	1.000
Ngoni	682 (37)	65 (10)	1.473 (0.998–2.174)
Other	411 (23)	46 (11)	1.762 (1.151–2.696)
Number of pregnancies ever had (gravidity)			
1 pregnancy	453 (25)	18 (4)	1.000
2–3 pregnancies	640 (35)	46 (7)	1.871 (1.069–3.277)
More than 3 pregnancies	719 (40)	95 (13)	3.679 (2.177–6.219)
Number of living biological children			
At most 1 child	538 (30)	22 (4)	1.000
2 children	369 (20)	32 (9)	2.227 (1.269–3.910)
3–4 children	533 (29)	45 (8)	2.163 (1.277–3.664)
More than 4 children	372 (21)	60 (16)	4.510 (2.682–7.585)
Head of household			
Woman	134 (7)	27 (20)	1.000
Husband	1529 (84)	120 (8)	0.338 (0.212–0.537)
Someone else	149 (8)	12 (8)	0.347 (0.166–0.726)
Number of household members			
Less than 4 members	467 (25)	17 (4)	1.000
4–6 members	1055 (56)	106 (10)	2.875 (1.695–4.875)
More than 6 members	362 (19)	36 (10)	2.762 (1.516–5.031)
District			
Balaka	452 (25)	56 (12)	1.000
Dedza	453 (25)	37 (8)	0.629 (0.406–0.975)
Mchinji	455 (25)	27 (6)	0.447 (0.275–0.723)
Ntcheu	452 (25)	39 (9)	0.667 (0.433–1.029)
Need factors			
History of miscarriage, stillbirth or premature birth			
Has history	350 (19)	44 (13)	1.000
No history	1462 (81)	115 (8)	1.684 (1.164–2.438)
Enabling factors			
Occupational status			
Not working	489 (27)	29 (6)	1.000
Working for self	1236 (68)	118 (10)	1.674 (1.099–2.551)
Working for others	87 (5)	12 (14)	2.538 (1.235–5.217)
Socio-economic status			
1 – Poorest	450 (25)	55 (12)	1.000

Table 1 (Continued)

Variable	Univariate analysis* Total sample: <i>n</i> (%)	Bivariate analysis	
		Delivery outside a health facility†- <i>n</i> = 159 (9%): <i>n</i> (%)	Odds ratio (95% CI)
2	459 (25)	42 (9)	0.723 (0.473–1.107)
3	459 (25)	33 (7)	0.556 (0.353–0.877)
4 – Least poor	444 (25)	29 (7)	0.502 (0.313–0.805)
Distance to official health facility			
<4 km from official facility	574 (32)	41 (7)	1.000
4–5 km to official facility	511 (28)	35 (7)	0.956 (0.599–1.526)
>5 km from official facility	727 (40)	83 (11)	1.675 (1.132–2.481)
Village setting			
Rural	1625 (90)	151 (9)	1.000
Urban	178 (10)	8 (4)	0.436 (0.210–0.904)

*We present frequency (and percentage) for categorical variables (age, marital status, education, religion, ethnicity, head of household, district, history of complication, occupation status, socio-economic status and village setting) and mean (and standard deviation) for continuous variables (total number of pregnancies, number of living biological children, number of household members and distance to facility).

†The percentage in this column is a row percentage, that is 7% for women whose age is below 22 years is derived by dividing the column's '*n*' (40 in this case) by the '*n*' under sample distribution, that is column for the total sample distribution (which is *n* = 601 in this case). Thus, 7% = 40/601.

within the model with the additional variable using the likelihood ratio test. Thus, the model with the additional variable was tested to assess whether it had a superior explanatory power than the model without the additional variable. If the test indicated that the model was not nested, another variable was added to the model with the intercept and the test was repeated. If the model with the intercept was found to be nested in the model with the additional variable, then this new model was taken to be superior to the one with only the intercept. This procedure was repeated until all the variables were entered into the model and tested to examine whether they improved the explanatory power of the model.

Results

Of the 1812 women included in the sample, 159 (about 9%) did not deliver in a health facility, but at home (*n* = 84; 5%), on the way to a facility (*n* = 44; 2%), at the premises of a traditional birth attendant (*n* = 29; 2%) or elsewhere (*n* = 2; 0%). Table 1 describes the characteristics and distribution of the study population. The table also shows unadjusted odds ratios of the independent variables to delivery outside a health facility.

Women who were unmarried, without any formal education, multigravid, had lower social economic status and resided in a rural setting were more likely to deliver outside a facility. In addition, number of household

members, Balaka district, history of previous miscarriage, stillbirth or premature birth, occupational status and distance to facility all were significant at 5% level.

Table 2, which presents the results of the multilevel logistic regression, shows the odds ratio and *P*-values only for variables that were included in the final reduced model after conducting the step-up model identification process. Variables such as occupational status, ethnicity, past experience of miscarriage, stillbirth or premature birth, head of household, number of household members and distance to official health facility were not included in the final model because they did not add any predictive power to the model. Women were more likely to have experienced a non-facility-based delivery if they were not married, came from a household with lower socio-economic status and came from rural areas. A high number of previous pregnancies and not having any formal education were positively associated with the probability of not delivering at a facility, although the associations were not statistically significant.

Discussion

Compared to prior estimates from Malawi as a nation [11, 31, 32], this study detected a much lower rate of non-facility-based delivery, suggesting that fewer than 10% of all women deliver outside a facility. Our findings are aligned with prior studies, based on the Malawi

Table 2 Results of the multilevel logistic regression ($n = 1812$)* – adjusted odds ratios

Variable	Odds ratio	P-value	95% CI	
			Lower	Higher
<i>Non-facility-based delivery (outcome)</i>				
Predisposing factors				
Marital status				
Married (reference group)	1			
Unmarried	1.8754	0.0190	1.1086	3.1726
Education				
Some formal education (reference group)	1			
No formal education	1.4337	0.0790	0.9594	2.1427
Number of previous pregnancies	1.1428	0.0850	0.9817	1.3304
Enabling factor				
Socioeconomic status				
1- Poorest (reference group)	1			
2	0.6658	0.0830	0.4206	1.0540
3	0.5114	0.0340	0.2750	0.9508
4 = Least poor	0.4810	0.0040	0.2919	0.7928
Village setting (urban/rural)				
Rural (reference group)	1			
Urban	0.3925	0.0010	0.2315	0.6655
Model fit and diagnostics				
Random effects				
Rho coefficient: SE		0.1455		0.0475
Diagnostics				
Wald χ^2 (9); $P > \chi^2$		61.22		<0.0001
Log- pseudo likelihood		−490.2		
Likelihood ratio test of rho; $P \geq \bar{\chi}^2$		34.95		<0.0001

*Following the model identification procedure outlined above, we did not include the variable under the determinant category of need factors; hence, the regression results table does not show ‘need factor’ category of determinants. Odds ratios, CI (confidence interval) and P -values obtained from a multivariate logistic regression model are adjusted for clustering of pregnancy outcomes within health centre catchment areas.

Demographic Health Survey (DHS), which have been showing a steady national increase in utilisation of facility-based delivery, from 57% in 1992 [49] to 55% in 2000 [50] to 57% in 2004 [23] and then drastically increased to 73% in 2010 [11]. The trend clearly shows that a more substantial increase has taken place over the last very few years. It should be noted that our sample is not nationally representative. The data presented in the DHS reports are national, while those reported in this study are only from the four districts in question. The study districts may have better than average access to healthcare services. Utilisation of facility-based delivery is likely to have rapidly improved as a result of several strategies that the MoH in Malawi has implemented over the past few years. These strategies included banning traditional birth attendants from attending to deliveries [17, 21] and the involvement of traditional leaders in

encouraging women to deliver only at healthcare facilities [21, 22] both implemented before end of 2012.

Similar increases in utilisation of facility-based delivery have recently been reported elsewhere in SSA, frequently as a result of policies specifically targeting maternal care services [8, 25, 51–53]. Still, it is somewhat surprising that our findings indicate that utilisation rates in Malawi are higher than in other sub-Saharan countries. In 2007, a study in Ethiopia indicated that 86% of all deliveries occurred in a facility [54], while a study in South Africa indicated a utilisation rate of nearly 75% [55]. The reduction of user fees in Burkina Faso promoted a steady increase in the utilisation of facility-based delivery, from 49% in 2006 to 84% in 2010 [56]. Similarly, a complete removal of user fees in Ghana improved utilisation rates of facility-based delivery although the rate did not to exceed 60% [57]. Further qualitative research is needed

to explore factors responsible for the rapid increase in utilisation rates observed in Malawi, as compared to other countries in the region.

The unadjusted descriptive results show that women who are at risk of delivering outside a health facility tend to be those who are advancing in age, unmarried, have higher gravidity, have more children, coming from households with more household members, have no past history of stillbirths, miscarriage or premature births, or live far from health facilities. In addition, women who have some form of education, their household is headed by either a partner or another person, or come from urban areas tend to have a lower risk of delivering outside a health facility.

Still, the fact that nearly 10% of all pregnant women still deliver outside a health facility without assistance from skilled attendants suggests that current strategies fall short of reaching all women and that there is space for improvement to ensure that all women have access to safe labour and delivery services. In alignment with prior evidence from sub-Saharan Africa [9, 32, 52], our study identified factors, such as not being married and coming from a poor household, as being associated with non-facility-based delivery. Bearing in mind the obvious need to recognise and respect women's right to freely decide where to deliver, including at home if this should be their preference, these findings suggest the existence of remaining barriers to access, impeding some women from delivering in the presence of a skilled attendant.

Albeit aligned both with evidence from other SSA countries [9, 58–61] and drastic decreases in deliveries outside facilities in comparison with findings from prior studies in Malawi [31, 32], the effect of socio-economic status on the use of facility-based delivery suggests that the mere provision of services free of charge at point of use is not sufficient to overcome the barriers to access imposed by poverty. This suggests that the egalitarian policy implemented by the country is not fully equitable, as it is not capable of fully ensuring that the poorest gain equal access to services. The poorest face a number of deprivations [52] which, coupled with the indirect cost of seeking care [62], are likely to discourage them from seeking the care they need, even when they do not have to pay for services. High indirect costs of seeking free TB care in Tanzania were found to affect the poor much more than the less poor [63]. Reaching out to the poor would imply actively implementing pro-poor policies to provide women in need additional incentives to deliver in a facility. A possible starting point could be that of recompensing poor women for the indirect costs faced when seeking care, as done in other low- and middle-income countries [51].

Furthermore, the findings show that non-facility-based delivery is associated with a pregnant woman's level of vulnerability, beyond poverty alone. For instance, our findings indicated that unmarried women were more likely not to have delivered in a health facility. The reason is not clear but it may likely be a consequence of the 'male involvement' strategy promoted by the Malawian health authorities, whereby men are encouraged to attend antenatal and perinatal services where information on maternal health is provided to couples [64, 65]. As pregnant women who come to facilities with their spouses are served 'first and fast' [64], it is possible that this policy may be adversely affecting unmarried women, ultimately discouraging them from returning to a health facility to deliver. In addition, single mothers may be stigmatised and thus not willing to deliver at a health facility as they may anticipate a negative interaction with providers [60]. It is also possible that being unmarried implies the absence of financial and moral support, hence explaining the lower utilisation rate of unmarried women. Further qualitative research is needed to explain how marital status shapes use of maternal care services, especially considering that evidence from SSA is discordant, with some studies suggesting an effect [66, 67] and others not [68].

Reflecting another dimension of vulnerability, our study detected that the least educated women were also the least likely to deliver in a facility. Our observation confirms findings from prior research conducted in Malawi [31] as well as in other SSA countries [9, 58, 61, 69, 70]. Similar to what was described in relation to marital status, the least educated women may avoid contact with services out of fear of a negative interaction with providers [9]. Alternatively, they may forgo services just because they lack the means to fully appreciate their benefits [31].

Unsurprisingly, considering that the effect has been repeatedly reported [8, 61], our study detected that rural women were less likely to deliver in a facility than urban women. Considering the fact that our analysis did not detect an effect of distance on utilisation rates, the association between area of residence and utilisation of facility-based delivery is likely to reflect supply-side factors related to quality of care considerations [71] rather than to geographical accessibility. On the one hand, it is plausible to assume that women in urban areas are served by better quality facilities and may therefore be encouraged to use the services on offer. Further, rural women are more likely to be influenced by traditional beliefs and practices, which may at times deter them from using services [9]. On the other hand, the lack of effect of distance on delivery outside a facility in the regression, albeit it being significant in the univariate and bivariate analyses,

may be the result of either different methods used to estimate distance or even the effect of government's increased efforts to improve access to care in areas not served by public facilities through contracts with private not-for-profit facilities [18]. Using a straight line from household compound to facility as a measure of distance does not reflect the actual distance travelled and does not take into consideration the differences in topography and transport mechanisms of the different catchment areas. These factors may introduce bias to the findings. However, Nesbitt and colleagues [44] concluded that different methods of measuring distance were highly correlated with each other. They further observed that the '...effect estimates (odds ratios) for facility use were the same for all ... [different] measures [of distance]...'.

Conclusion

We identified factors associated with non-utilisation of facility-based delivery in rural Malawi and detected higher levels of facility-based delivery than previously reported in Malawi. Despite the absence of user fees at point of use, a substantial proportion of women still do not deliver in a health facility. This proportion especially comprises women who are not married, have low levels of education, are poor and live in rural areas. Therefore, in addition to considering medical and public health interventions, policies to encourage facility deliveries should specifically reduce inequities in access, by addressing and counteracting potential sources of vulnerability.

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